

The Anvil's Horn

A Publication of: The Arizona Artist Blacksmith Association

Issue No. 161

March, 2013



Mesquite and iron nesting table by Ira Wiesenfeld

President's Message:

This month we are following through with the plans to bring you great demonstrations and activities. Leading off are open forges at Dan Jennings' Traditions in Iron in Chandler and at Harold Hilborn's Holy Hammer Ironworks in Tucson on March 2nd. On the heels of that is the DOVES Iron and Art event at the Para Club in Tempe. Several of our members will be there to demonstrate blacksmithing and sell their wares to support this worthwhile charity fund raising event.

Next up is the demonstration by British Blacksmith Richard Bent at Pioneer Village. As you may recall Richard was one of the smiths Mark Aspery worked and studied with early in his career. On that same weekend is the annual Folk and Heritage Festival at Sahuaro Ranch for those so inclined. On April 6th there will be open forges at Harold Hilborn's Holy Hammer Ironworks and at Peter Sevin's Art Iron Works in Sunnyslope.

Cathi Borthwick is arranging an arboretum show in Flagstaff and we are returning to the Arizona Historical Society Museum in July. Our Tucson guys have re-opened the forge at the Presidio and are planning a November event there. Demonstrators will be Mark Aspery and Gordon Williams. Watch for details coming soon.

Meanwhile be sure to check our web site at www.AZBlacksmiths.org often for the latest news. Sometimes we have to make last minute changes and additions. We don't want anyone to miss an opportunity to see, learn and participate.

Until next time, Safe and productive forging.

Doug Kluender

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Demo: March 23 and 24

New Venue: Pioneer Living History Museum

Don't Miss Renowned British Artist Blacksmith

Richard Bent

The demonstration will begin with Richard arriving at the forging station as a *blacksmith unloaded*, equipped with only a hammer and a pair of hands. As the demonstration progresses he will make tools as they are needed and explain their use. This promises to be an entertaining, vigorous, noisy and energetic event.

Richard is an award winning Fellow of London's Worshipful Company of Blacksmiths. He is noted for his commissioned pieces of art found in both public and private collections in the United Kingdom.

His work can be viewed at www.redanvilstudio.co.uk



The demonstration is being held in the blacksmith shop at **Pioneer Village Living History Museum** starting at 9:00 am. Registration opens at 8:00 am.

- Admission to Pioneer is covered in the attendance fee.
- The attendance fee of \$20 (\$25 for non-members) covers both days or 1 day.
- A special lunch is being offered by the Chuck Wagon Restaurant on the grounds for a cost of \$7.00 per person.
- Camping is available for a fee and there is a KOA next door.
- Tailgating is OK, bring your stuff.



Remember Iron In the Hat

Thanks to all of you who have participated in Iron In The Hat. By purchasing tickets and donating items, you help support AABA events and projects. Items for donation can be a tool, piece of art, something you don't utilize in your shop, a great book, t-shirt, hat... something an AABA member would enjoy.

Thanks for your continued support.

Directions to
Pioneer Living History Museum
3901 W. Pioneer Road Phoenix, AZ
85086

Take I 17 North from Phoenix
To exit 225 (Pioneer Rd.)
Go west and follow the signs.

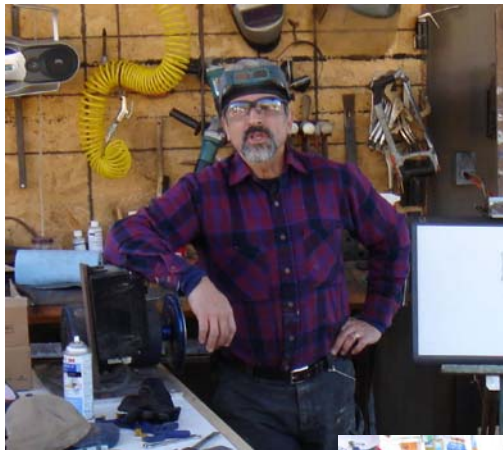
January Demo Report: Josh States, Liz Carlier & Paul Dief

We had a great day at Dief's Desert Rat Forge. Josh presented a comprehensive, entertaining tutorial on making a stock removal knife. Steve Emms posted a great video of Josh's demo on You Tube (thanks Steve). There's a link to the video on www.az-blacksmiths.org click on Plans. Josh's demo notes are there, as well.

Liz's demo was on etching steel. I had not heard of the etching solution she used and I like the idea that it's relatively safe, fast and the ingredients are easy to obtain.

Her recipe: 45% Copper Sulfate (buy it as Root Kill in the plumbing department at the home center), 45% table salt, 10% PH down (sodium Bisulfate which is sold at pool supply stores.) Put the ingredients in a bucket (they're all dry) and add water until it's a nice blue—about 1.5 gallons per cup of copper sulfate. More information is on the same website, click on Plans.

Paul presented an overview of his methods and philosophy on making yard art butterflies and followed that with a forging contest.



Liz artfully drew some flowers and vines with an artist brush and shellac. When the etching is done, everything that wasn't covered has texture and depth.



Josh's oil filled heat treating tank.



Blade center scribing jig



AABA Auction/Luncheon 2013

This year's event is going to be held at Sahuaro Ranch on October 26th to raise money for our general education fund. What does this mean? It will go towards subsidizing demonstrators at our bimonthly demos. This year alone we are bringing in three very well known smiths—two of them from the UK. These smiths aren't the cheapest, but they put on a great show and offer an opportunity for us to expand our skills and ideas. Why not keep this going so next year we can have some more great demos?



What this means, is that we need your help to make some great items for the auction. All of us don't have the time or maybe the skill to make that intricate table or window grill that we all dream about, but every one of us can make something small. How about making a simple bottle opener or a small candle holder? Most of us have made a railroad spike into a knife, a meat turner or a troll.

Need some ideas? There's a few items from previous auctions scattered around the page, some by novice blacksmiths and some by the pros.

If you're feeling really ambitious, intimidated or creatively challenged, you can team up with a few friends and make a group project. The combined efforts of a group often create something greater than one person can do on his or her own.

I'm telling you this now because you still have 6 months to prepare. That's a lot of time to make anything. Start thinking and start hammering!

Lastly, if you have any old tools laying around or something that can go towards making a project, like pieces of wood for table tops, or a stack of scrolls, or maybe an old rivet forge that needs rebuilding, we can use anything like that in the auction as well.

Oh and don't forget that cash to buy all the stuff you just donated! See you there!
Jason LaBrash



Pioneer Living History Museum

by Rodger LaBrash

There's a Smithy north of Phoenix at the Pioneer Living History Museum based on the old Blacksmith shop that used to be in Globe. I was introduced to this shop after a lot of encouragement by Jim Carpenter to be his new smith. He needed someone to demonstrate to the school kids as well as other tourists that come by.

The smithy had not been kept up in the past few years, so there was a ton of cleanup to be done as well as a bit of maintenance. It has an old brick forge as well as a cast iron forge in the main forging area. There are a couple anvils and a 25# Little Giant that was not running. I got it working, and am now fine tuning it!

The shop is full of tooling as well as dust! I'm working a little each time I'm out there to fix or clean. If you would be interested in coming out for a look let me know, If you would like to help, ie....clean, demo and / or maintenance I would be glad to have ya!

I'm hoping to get this place up to snuff then have some demo's as well as maybe a old time smithy to be used for an open forge or two!

"GRIZZ"

602-717-1458

Ed note: It worked out that we needed a venue for this month's demo with Richard Bent. If you can help get the smithy ready for the demo, give Grizz a call..

See you there on March 23!



Blacksmith on a Bike — Gordon Williams

I'm excited about my upcoming adventure, "Blacksmith on a Bike." My friend Mike Allen and I will be riding our bikes from Fairbanks, Alaska to the railing we made on the South rim of the Grand Canyon, unsupported. (*ed note: I believe this means without a vehicle following behind, carrying food, water and other essentials. It probably has nothing to do with undergarments.*)

The 10 year Pieh Tool Anniversary Celebration and Demonstration will be the kick-off event for the adventure. (*See page 12.*)

The Association of Alaska Blacksmiths is graciously allowing me to demo for them to kick off my trip. I will be speaking along the way at colleges and Universities, doing demos and gathering tips, tricks, and techniques to share from blacksmiths along the way.

The trip will take two and a half to three months to complete (I have never had a week off in my life). My intension with "Iron as Art through the America's" is to promote ABANA and all our state blacksmith associations, and "Knowledge Equals Growth".

We have all heard... "Wow you're a blacksmith, that's a dying art, there are not many of you left." But we are not only thriving, we are growing. Our doors are open to all and we are the most gracious, talented and willing to share craftspeople in all the world!

I'm hoping to come back with much to share, maybe some new stories and in one piece. And I guess after 4000 miles on a bike seat I will qualify as a real hard ass! So as a closing thought, follow your B.O.A.B. (blacksmith on a bike) and make your dreams come true. Lets all keep the anvil ringing.

If you can't be a good example at least be a horrible warning!
Thank you, Gordon Williams



Member Gallery: Steve Miller



Inspired by Brett Moten's demo, Steve created this three legged table held together by a wedge.

For those who don't know Steve, he is relatively new to blacksmithing. He made this table for a final project in a blacksmithing class he took at MCC last semester. Of course, he probably learned most of what he used when he took Gordon William's class at Pieh Tool.

Steve made most of the table from clay before deciding on texture, shapes and joinery.

The piece is finished with Japanese Brown patina.



Ironwork at the Arboretum

CALL FOR ENTRIES

The Arboretum at Flagstaff
July 3 – September 29, 2013

The 2012 Botanical Blacksmiths exhibit was such a success that we've been invited back! This year they have added another month to the length of the exhibit to take advantage of the beautiful fall colors in September (allowing even more people to see the ironwork). We are scheduling the "Artist Meet and Greet" to be on the same weekend as the July hammer in at the Pioneer Museum in Flagstaff, so you can enjoy an ironwork weekend in the high country.

Eight smiths participated in the 2012 exhibit. The exhibition was well received by the public and several pieces sold (mostly functional work such as birdbaths and wind chimes). We were also able to put work in the gift shop throughout the summer and a number of those pieces sold as well. Participation in the exhibit is open to all AABA members, hopefully, even more will take advantage of this opportunity to show their work in 2013. Here is all the information you should need. If you have any other questions please contact:

Cathi Borthwick, Flag Forge

928-779-1791

flag_forge@earthlink.net

About the exhibition and exhibition locale

The Arboretum at Flagstaff encompasses 200 acres of gardens, greenhouses, and natural habitats. In the summer, it blossoms with penstemons, migrating birds, and visitors! The members of the AABA are being offered the opportunity to show how ironwork, that is created for an outdoor setting; blends with and enhances gardens and outdoor spaces. Ironwork displayed in the 2013 show should not have been shown previously at the Arboretum. Sunday, July 21, will be a meet and greet event and participating blacksmiths are invited to bring additional work up to offer for sale. Some of this work might be accepted by the Arboretum to sell in their gift shop throughout the rest of the summer (note: their gift shop is small so smaller, more moderately priced work will probably be more desirable). While this show is a non-juried exhibit, you are asked to send in the application and photos/details about your work to aid in planning the layout of the show (also, good photos of the work submitted are much appreciated for use in advertising of the show). You can submit up to two pieces. However, if there are an abundance of applications, there may have to be a culling process, so please list your work in the order of preference for inclusion into the exhibit. Work may be offered for sale.

Calendar

May 31, 2013 - Deadline for receipt of application

July 1-2, 2013 – Deliver and install ironwork

July 21, 2013 – Artist Meet and Greet in the Gardens

September 29, 2013 – Exhibit closes

Sept 30, Oct 1, 2013 – Pick up work

Important Information

*Artist is responsible for delivery, installation, and pick up of artwork. Arboretum staff and vehicles are not available for artist use.

*Artwork will be displayed in an outdoor setting. It must be able to withstand exposure to the elements and to the public.

*Artwork should be suitable for family viewing.

*Limited security is provided by The Arboretum at Flagstaff. The Arboretum assumes no liability for loss or damage to artwork.

*Commission on artwork sold is 30%

The application and artist's waiver are available at www.az-blacksmiths.org. Please fill them out and get them to Cathi before May 31.

CALENDAR 2013

March 2	Open Forge	Holy Hammer Ironworks	Tucson
March 2	Open Forge	Dan Jennings Traditions In Iron	Chandler
March 10	Open Forge	Desert Rat Forge	Cave Creek
March 16	Doves	Para Club	Tempe
March 23/24	Folk & Heritage festival	Sahauaro Ranch	Glendale
March 23/24	Demo Richard Bent	Pioneer Living History Museum	Phoenix
April 6	Open Forge	Peter Sevin Art Ironworks	Phoenix
April 6	Open Forge	Holy Hammer Ironworks	Tucson
April 14	Open Forge	Desert Rat Forge	Cave Creek
May 4	Open Forge	Ron Kinyon Falcon Forge	Mesa
May 4	Open Forge	Holy Hammer Ironworks	Tucson
May 11	Demo	Bar-U-Bar	Skull Valley
July 20	Demo	Northern AZ Historical Museum	Flagstaff
September 21 & 22	Demo Adrian Legg	Bill and Karen Morris'	Camp Verde
October 26	AABA Auction	Sahuaro Ranch	Glendale
November 9	Demo Mark Aspery	Presidio	Tucson

Doves:

Iron and Art in the Desert

March 16 at the Para Club. 1 E. Continental Drive, Tempe

DOVES® late life domestic violence & elder abuse program hosts an event every year in conjunction AABA artists. AABA members are encouraged to make items and sell them at the event. Artists donate 30% of each sale, plus donate an item for their silent auction. This is a great way to make some extra money while supporting a great cause. All AABA members are welcomed and encouraged to participate.

"We are expecting over 500 guests! This year we can start pre-promoting the Blacksmiths who are participating. A link will be added to our website so that we can feature every artist. We will post their bio, a picture that represents their artwork and web address.

We will have 1 hour designated to a demo and would love for (2) artists participate."

Cathy Shiroda Doves event coordinator

If you would like to participate by selling your wares there may still be time. Contact:

cshiroda@rescare.com or fax: 623-434-8560

Questions? Phone Cathy at: 623-434-8432

DOVES® is a 501c3 organization.

Kinyon Vise Workshops

The vise without a base built during the workshop is around \$150. Ron is requiring a deposit to reserve a slot in a workshop. If you'd like to build a vise in a workshop, Ron's email is ronkinyon@aol.com

Deadline: April 5 for the May issue of the Anvil's Horn. Articles, photos, notices, and ads can be emailed to: Danshammer@cox.net or mailed to AABA 2522 W. Loughlin Dr. Chandler, AZ 85224

Welcome New Members

Bryan Colon

Emily McCall

William & Kim Safi

Pat & David Lown

Aaron Poplin

Want Coal?

Harold Hilborn is planning a bulk purchase of coal in 50# bags if there is enough interest among AABA members. Our cost will depend on the size of the order. Pre-paid purchases will be approximately AABA cost. Inventory that isn't pre-paid will be marked up a bunch.

Contact Harold 520-603-6723 or Hhiborn@aol.com

AABA Website: AZ-blacksmiths.org

Open Forge: Tucson

Harold Hilborn will be hosting Open Forges on the first Saturday of March, April & May.

Holy Hammer Ironworks

Tuller School 5870 E 14 St. Tucson

Questions Harold 520-603-6723 or Hhiborn@aol.com

Open Forge: Desert Rat Forge

Paul Dief will host an open forge on the second Sunday of each month from 9 am to noon, followed by lunch at the world famous Big Earls Greasy Eats in Cave Creek. Desert Rat Forge is at:

40218 N 78th St, Cave Creek

Paul: 602-509-1543 or dief@phoenixrockgym.com

Directions: From the center Cave Creek - 4-way stop at Cave Creek Rd & School House Rd. Head north on School House 1.5 miles to Highland Rd.(if you get to the 4-way stop at Fleming Springs you gone a tad too far). Turn right (east) on Highland. After about 1 mile the pavement ends. Keep going on the gravel road until the pavement starts up again.

Turn right thru the stone walls down a paved driveway You are there!

Open Forge at Valley Shops

Several forges in the Phoenix area have volunteered to host open forges on first Saturdays of each month. These will be in addition to the second Sunday Desert Rat Open Forges. Check the web calendar for updated info.

March 2: Dan Jennings 2522 W Loughlin Dr., Chandler

April 6: Peter Sevin 9235 N. 10th Drive, Phoenix

May 4: Ron Kinyon 7656 E. Hermosa Vista, Mesa

Pieh Tool 10 Year Anniversary Celebration and Demonstration

Pieh Tool will be hosting their 10 Year Anniversary Celebration at 661 E. Howards Road, Camp Verde, AZ on Saturday and Sunday, May 11 and 12, 2013. We are accepting donations for Iron in the Hat. The proceeds from Iron in the Hat will be donated to the Relief Fund for Blacksmiths from Hurricane Sandy.

We will have several smithing demonstrators: Blacksmith Artist Tim Cisneros, Master Bladesmith Ray Rybar, Chasing and Repousse Metalsmith Fred Zweig, Blacksmith and Silversmith Valerie Ostenak, Blacksmith Instructor Gordon Williams, Metalsmith William Weathersby, and Pioneer Blacksmith Demonstrator Eric LeBlanc.

Our educational celebration includes morning coffee and donuts, daily lunches and Saturday dinner. On Saturday evening we will have teaching tents available for those who are interested.

There are campgrounds nearby and hotels available for your convenience. You can register online www.piehtoolco.com, item #DEMO, \$50 by April 1. There is also an area available for tailgaters, but you must register, as space is limited.

Beginner/Intermediate Blacksmithing Classes with Gordon Williams

March 15-17, April 12-14, May 3-5

\$455 per 30 hour class. All materials and equipment are provided.

Bill Pieh Resource for Metalwork at Pieh Tool in Camp Verde, Arizona. Contact: 928-554-0700 or www.piehtoolco.com

AABA New Member and Membership Renewal Form

Name _____

Address _____

City _____ State _____ Zip _____

Phone _____ Email _____

Professional blacksmith _____ Hobbyist _____ Farrier _____ Blade smith _____

Your main blacksmithing interest _____

Occupation or skill _____

Please check one:

Regular membership (\$30) _____

Family membership (\$35) _____

Mail to: Terry Porter
2310 E. Melrose St.
Gilbert, AZ 85297

Make Check Payable to AABA

Building a Gas Forge

Some New Thoughts on Gas Forges

by Dan Jennings

“Knowledge is just a placeholder until there is better knowledge.” Mark Aspery

Teaching in a blacksmithing lab with a flow meter on a forge has been able to help us figure out relative flows of different types of burners, and gas pressures. We have found the single 1” pipe burner to be more fuel efficient and hotter than 2 of the 3/4” burners. They will run on less gas pressure and still get hotter, and that translates into better fuel economy.

The blacksmithing lab provided another bit of information that seems counterintuitive. The lab has 12 forges whose housings are made from pipe. Some are 12”, some are 10” and others are 8” diameter. They all use 1” thick ceramic fiber blanket and all have the same the heat source: 2 burners, made from 3/4” pipe with .023 MIG tips for jets. And they are all plumbed into the same 500 gallon propane tank and each has a regulator set to around 12 psi.

It would seem that the 8” forges would get hotter than the 12” forges. After all, there is less volume to heat and keep hot. We all know that the bigger the house, the larger sized heat pump is needed to heat or cool.

In the lab however, observation tells us that the 12” forges get hotter than the 8” forges. Why? The answer was provided by one of my students who is an HVAC engineer. The flame needs room to complete its burn before it is interrupted (in this case, by the opposite side of the forge). Disrupting the burn means that some of the fuel is not burned, which not only means it doesn’t produce heat, but it actually cools off the flame in the same way that richening the mixture in a car engine makes it run cooler. In practice we have found that a 12” forge has more room to work, gets slightly hotter and uses no more fuel than a 10” forge. However, the 10” is still a viable option.

Ideally, our new forges are 12” diameter pipe, 9” long with 2” thick, 8 pound ceramic fiber blanket (Kaowool or Cerewool are 2 brand names); powered by a single burner made from 1” pipe with a .045 MIG tip for the jet. You will need an adjustable propane regulator with a gauge (acetylene regulators work), and about 5 feet of hose that is approved for propane. A 5 gallon (BBQ size) propane tank fits in the forge stand.

This arrangement of pipe fittings was influenced by work done by Frank Villars, David Starr, Larry Zoeller and others. However, any arrangement that uses some kind of venturi and a 1” pipe nipple with the .045 MIG tip might produce similar results.

What follows is a photo build of the forges similar to what we’re building now. I had a couple pieces of 10” pipe and welded them together to get a housing 9 1/4” long. If I had 12” pipe I would have preferred to use it.



Burner parts: (Left to Right) 1” x 10” black pipe nipple, 1 1/2 x 1 x 1 1/2 black pipe tee, 1 1/2 black cored plug, .045 MIG tip, 1/8 x 1/2 schedule 80 pipe nipple, 1/4 x 1/8 MIP x FIP brass bushing, 1/4 full port threaded ball valve, 1/4 brass 90 degree street elbow, 1/4 MIP x left hand gas fitting. Note: The MIG tip should have 1/4-28 threads. Get that size nut and take it to the welding supply, they will have no idea what you are asking for. While you’re there get the 1/4 MIP gas fitting. Source: PEXSupply.com has most of the fittings, Grainger 1/8 sched 80 nipple (pn ILLV2), Airgas MIG tip and left hand gas fitting.



Machining: drill a hole through the center of the plug the same size as the 1/8 nipple (mine was 13/32). Ideally the hole should be concentric with the 1 1/2 pipe threads. Drill and tap a hole for a screw to hold the nipple in place .

Run a 7/32 drill into one end of the 1/8 nipple. Tap that end 1/4-28 .

Right: This plug can be used as is, but some plugs are cored a lot more and do not have enough material to provide support for the nipple. To solve that problem fill the cavity with mig weld before you drill.



Left: When you assemble the 3 pieces and screw them into the tee, the hole in the MIG tip should be in the center of the opening. If not, a little bending is in order.

*Right: My leg vise and twisting wrench work well to get the bushing tight on the 1/8 nipple.
Below: assemble the remaining fittings with Teflon tape or pipe dope*

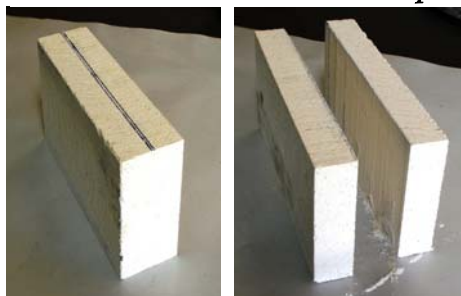




Left: I personally don't think the baffle is needed, but some smiths like to be able to create a richer (reducing or less oxidizing) atmosphere in the forge. Just remember not to block the air off completely or you risk a nasty explosion as the gas fills the forge without any oxygen. (That's the reason for the large hole in the center of the baffle.)

I welded a 1/4-20 bolt to the side of the T and welded the sheet metal baffle to a nut. The second nut serves to lock the baffle open.

Now that we've completed the burner we're ready to start on the housing.

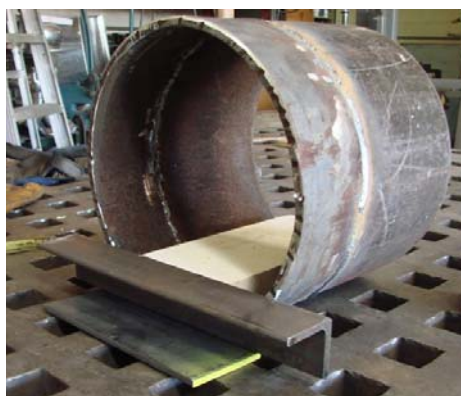


This is a lightweight refractory 2600 degree brick. I get them at Pacific Insulation. Bricks are 9" long and are one of the reasons we make the forge housing 9" long.

For a 10" forge, cut the brick in half as shown on the left. I use a band saw, but they will cut easily with a hack saw or even a wood hand saw.

For a 12" forge they can be left full thickness.

The brick likes a flat surface to sit on. This is a piece of scrap 1/4 x 3 and the holes were already there—they are not needed. This plate gets tack welded in place. (This housing was pieced together from leftovers—that's why the radial weld in the middle.)



Left: With the brick in place, 2 x 2 x 1/4 angle (this is 13" long) is flushed with the top of the brick and tacked in place. I like to tack from the inside so the weld shrink will pull the angle tight to the housing. The process is repeated on the other side.

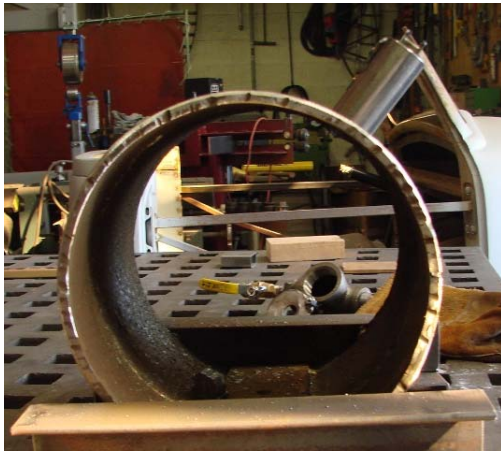
Right: Then they are welded on the outside.



Left: Burner retainer. This is a piece of tubing 3" long that the 1" pipe nipple will slide into. Drill a hole to accept a 1/4 bolt. Weld a nut to the outside to create a set screw.

Right: Torch or plasma a hole for the retainer. I have a magnet holding it in position.





From the front view: I like the angle of the burner to be about 50 degrees from horizontal and the center line of the burner to follow the centerline of the housing. We want to give the flame as much room as possible to complete the burn. When all is good, fully weld the retainer tube to the housing. Don't leave any gaps for the heat to escape.



I use a carpenter's square and a utility knife to cut the Kaowool. The Kaowool should stick out of the housing about 1/4" on each side and butt against the side of the brick. Cut a hole so the Kaowool fits tightly around the burner.



The complete photo build including the forge, stand, doors and FAQ's is available on the AABA website:

www.az-blacksmiths.org click on Plans

Angle Iron Leftovers

BY Cathi Borthwick

I use a lot of angle iron to make frames for table tops and mirrors. Even though I try to be efficient when cutting out the project, there are always leftover pieces. I could recycle these but the mantra says reduce, reuse, recycle so I have come up with a few ways to “reuse” some of these leftovers in new projects. Here are three of those projects.

Leaf

You can use any size angle iron for these leaves, just choose a width and length that is proportional and appropriate for your project. The beauty of using angle for these leaves is that the corner of the angle gives you a natural vein and makes it easy to snug the leaf up to a stem for use in your final project.



Step 1- shows the original piece of metal, in this case a piece of $\frac{3}{4}$ " angle iron.

Step 2 - heat the metal and close it up. As you will have to reopen it later it is best not to totally close it, just get it tight enough that when you cut it the two sides will come out more or less the same. Let it cool and then mark a nice curved line from the inside corner to the edge.

Step 3 – Cut along the line. I use a vertical band saw for this step but you could use a hacksaw or do it hot using a chisel.

Step 4 – Reheat the metal and open it up by using the edge of the anvil or a chisel to pry open the folded piece of angle iron. Don't open it flat, just enough to look like a leaf. Hammer the edges of the metal to visually soften and give it more dimension. Curve it over the horn of the anvil.

Feather

I usually just use $\frac{1}{2}$ " or $\frac{3}{4}$ " angle for these. Use a length that makes a nicely proportioned leaf – too long or too short makes for an ungainly look. I use these feathers as accents on various projects. I have also made Christmas ornaments out of them by making the quill part long enough to curl into a small ring that can hold a hanger.



Step 1 – shows the original piece of metal, in this case a piece of $\frac{1}{2}$ " angle iron, and gives you a sense of the length needed (this can be varied).

Step 2 – heat the metal and close it up. Again, as you will have to reopen it later it is best not to totally close it. Just get it tight enough that when you cut it, the two sides will come out more or less the same. Let it cool and then mark a nice curved line from the inside corner to the edge at the top and an angled and straight line at the other end.

Step 3—shows the metal after the cuts have been made.

Step 4 – Reheat the metal and round up the end that will form the quill. Then open it up by using the edge of the anvil or a chisel to pry open the folded piece of angle iron. Open it up so it lays flat and hammer the edges to thin them out and give them a nice edge pattern. Using a chisel, put in random lines to suggest the individual parts of a feather and cut through the feather in a few places. (Note: I have tried doing this step by using a saw when the metal is cold but it does not look as “natural” as using a chisel on hot metal.) Curve the quill and use the horn of the anvil to put some wiggles in the length of the feather. When cold, wire wheel the feather to get a clean shiny finish. You could apply a finish coat now or go to step 5.

Step 5- shows a couple of alternative finishes. In the left one, apply heat with a torch to the shiny feather and cool it quickly when the colors have run to your satisfaction. Then apply a finish coat. Or, dunk it in a copper coating solution. Polish it when dry, and apply a finish coat.

Butterfly

You can use any size angle iron and usually the bigger the better. I suppose you could use $\frac{1}{2}$ " but I never have as I don't have the patience or dexterity to hold on to such small pieces. The length of the metal should be about the same as the width, once the angle iron is opened flat. I use these as accents on other projects. I have also used ones made out of larger angle iron as garden art by attaching the butterfly to the top of a piece of rod.



Step 1 – shows the piece of metal to be used in this project. In this case it is a piece of $1\frac{1}{4}$ " angle iron.

Step 2 – heat the metal and hammer it flat. When cool, lay out the pattern to be cut which will be a series of vees or notches. In the center at the top and bottom, cut out narrow notches to define the thorax of the butterfly. The part at the bottom should be longer than the part at the top. Make a notch on the 2 sides of the angle iron to define the wings. These notches should be more than half way down the side and the deeper the better.

Step 3 – shows the metal after the cuts have been made.

Step 4 – heat the metal and hammer the 4 parts of the wings to spread and thin. Then curve up the edges to give it some life.

Step 5 – give the butterfly some antennae by using some welding rod. Heat up the end of the welding rod so that it forms a small ball on the end of two pieces of the rod. Then cut them to an appropriate size and weld them to the back of the butterfly. Wire wheel to make the butterfly shiny. Then, using a torch, heat color the metal and cool quickly when satisfied with the color. Apply a finish coat.

Note: The copper coating is a method shown by George Witzke a number of years ago at an AABA demo. To make the coating solution, dissolve a 32 oz. canister of Roebic K-77 root killer (*Root Kill is the brand found at Home Depot's plumbing dept., it is 99% copper Sulfate ed.*) in 5 gallons of purified water. Stir occasionally until fully dissolved, usually takes 1-2 days. Keep this solution in a covered container and use as needed. To use, dunk the metal into the solution being careful not to touch it while wet (this removes the copper coating). When dry, dip into water to clean surface and let dry again. Wipe clean. If you want it to be a shinier copper you can use a copper cleaner on it.

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Left: This sculpture was created during the January demo contest by Steve Miller with help from Dan Mahan. Steve added it to the Arizona Sierra Banded Sandstone after the contest.

Below: 'FLAT-BOY' a life-size-8 feet long & 4 feet tall sculpture by John Gourley from Arivaca

